MULTIMEDIA UNIVERSITY

STUDENT ID NO

VENUE :

SEAT NO :

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

TAR 3111 – RENDERING AND ANIMATION

(All sections / Groups)

11 OCTOBER 2016
2.30 p.m. – 4.30 p.m.
(2 Hours)

Question	Marks
1	
2	
3	
4	
Total	

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 7 pages with 4 Questions only.
2. Attempt **All** the questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Write all your answers in this Question Booklet.

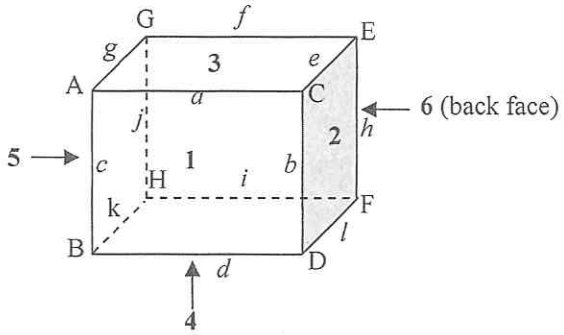
Question 1:

a) What are the advantages of representing 3D object with polygonal meshes? State **THREE (3)** reasons.

[3 marks]

b) Given a cube below, the A, B, C, D, E, F, G and H are being the vertices. The number 1, 2, 3, 4, 5 and 6 are the faces. The small letters *a* to *l* are the edges. Complete the Winged-edge table below.

[4 marks]



Edge Name	Vertices		Faces		Left Traverse		Right Traverse	
	Start	End	Left	Right	Pred	Succ	Pred	Succ
a	A							
b		C						
c	B							
d	D							
e		E						
f	G							

Continued....

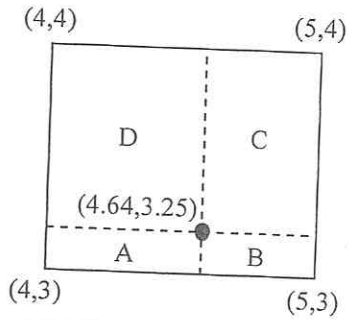
c) Describe how the winged-edge data structure can represent a solid with holes.

[3 marks]

Question 2:

a) Use linear method to find the color at pixel location (4.64, 3.25) in a new image.
Note: In OpenGL program, this method is called by GL_LINEAR.

[3 marks]



Color at pixel (4,3) is (0.3, 0.8, 0.0)
Color at pixel (4,4) is (0.1, 0.0, 1.0)
Color at pixel (5,3) is (0.0, 0.4, 0.0)
Color at pixel (5,4) is (0.2, 0.2, 0.0)

b) A point light source at S (0,9,0), casting a ray through a point V (7,4,0) on a box and intersect with a plane at V '. If the normal vector of the plane is (0,1,0) and a point P on the plane is (10,0,3), find the coordinate V '.

[3 marks]

c) Shadow is an area or shape produced by a body coming between rays of light and a surface. It plays a very important role while modeling an object. Give **FOUR (4)** advantages of displaying shadow in modeling.

[4 marks]

Question 3:

a) What is the Quaternion representation q of a rotation of 90 degree at a rotational axis u = (8, 0, 6)?

[3 marks]

Continued....

b) Given a camera located at (2, 4, 1) and directed at (-2, -4, -2), find the point (if there is any) where the ray cast out from the camera and hits a generic sphere.

[4 marks]

c) State **THREE** (3) characteristics why a model should be represented using the particle system method.

[3 marks]

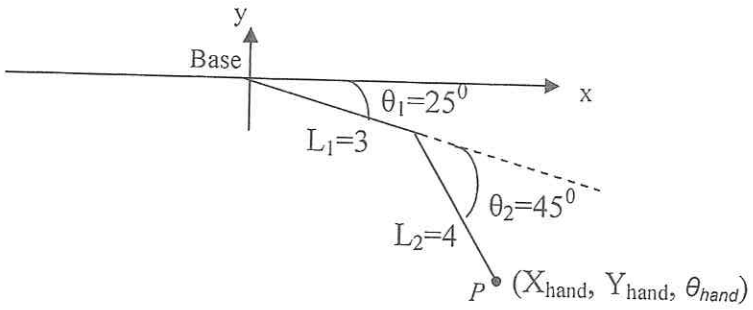
Question 4:

a) The Diamond-square algorithm is actively used to create fractal terrain. Describe how the Diamond step and Square step are performed.

[2 marks]

b) By using the Forward Kinematic method, find the position of the robot's hand at point P (x_{hand}, y_{hand}, θ_{hand}) from the following figure. The L is the length of each link and θ is the angle at each joint.

[3 marks]



c) Gouraud shading method produces high quality of shaded surface and yet maintains the moderate speed. However, there is a miss of one of the light effects (ambient/diffuse/specular). Which of the light effect and why?

[1 mark]

d) Describe the function played by each Inverse Kinematics solver below.
i) HI (History-Independent) solver
ii) HD (History-Dependent) solver
iii) IK Limb solver
iv) Spline IK solver

[4 marks]

End of Page.